

**I Claim:**

1. A modulated power supply comprising:  
a converter having a primary power switching device and a  
5 secondary power switching device; the converter having an  
output which is a combination of the outputs of the primary and  
secondary power switching devices; and,  
a controller for controlling operation of the switching  
devices in response to a modulating input signal, wherein the  
10 controller is arranged to operate only the primary power  
switching device while a property of the input signal lies  
within a first predetermined range and to operate both the  
primary power switching device and the secondary power  
switching device while the property of the input signal lies  
15 outside the first predetermined range.
2. A power supply according to claim 1 wherein the controller  
is arranged to maintain the secondary power switching device in  
a continuously on state during the periods when it is operated.
- 20 3. A power supply according to claim 2 wherein the controller  
is arranged to operate the primary power switching device in a  
manner which corrects the difference between the actual output  
signal, which results from operation of the secondary power  
switching device, and a desired output signal.
- 25 4. A power supply according to claim 1 wherein the controller  
is arranged to operate the secondary power switching device in  
a manner in which the output of the secondary power switching  
device is related to the input signal.
- 30 5. A power supply according to claim 4 wherein the controller  
is arranged to operate the secondary power switching device in  
one of: a pulse width modulated (PWM), a pulse density  
modulated (PDM) or Sigma Delta Modulated (SDM) manner.
- 35

6. A power supply according to claim 1 wherein the controller is arranged to operate the primary power switching device in one of: a pulse width modulated (PWM), a pulse density modulated (PDM) or Sigma Delta Modulated (SDM) manner.

5

7. A power supply according to claim 1 wherein there are a plurality of primary power switching devices which are operated together as a group.

10 8. A power supply according to claim 1 wherein there are a plurality of secondary power switching devices which are operated together as a group.

15 9. A power supply according to claim 1 wherein there is a further secondary power switching device and the controller is arranged to operate the further secondary power switching device when the input signal lies outside a second predetermined range, the second predetermined range being greater than the first predetermined range.

20

10. A power supply according to claim 1 wherein the property of the modulating input signal is amplitude.

11. A power supply according to claim 1 wherein the property  
25 of the modulating input signal is rate of change of amplitude.

12. A power supply according to claim 1 wherein the modulating input signal is an envelope of a signal for processing by a power amplifier and the output level of the power supply forms  
30 a power supply of the power amplifier.

13. A power amplifier comprising an amplifying device and a modulated mode power supply according to claim 1, wherein the amplifying device has an input for receiving an input signal  
35 for amplification, wherein an envelope level of the input signal is fed to the power supply as the modulating input

signal and the output level of the power supply forms a power supply to the power amplifier.

14. A base station for a wireless communications system  
5 comprising a power amplifier according to claim 13.

15. A base station according to claim 14 for use in a wideband communications network, wherein the input signal to the power supply is a wideband communications signal.

10

16. A control apparatus for controlling operation of switching devices in a modulated power supply which comprises a converter having a primary power switching device and a secondary power switching device, the converter having an output which is a  
15 combination of the outputs of the primary and secondary power switching devices, wherein the controller is arranged to operate only the primary power switching device while a property of a modulating input signal lies within a first predetermined range and to operate both the primary power  
20 switching device and the secondary power switching device while the property of the input signal lies outside the first predetermined range.

17. A control apparatus according to claim 16 which is  
25 arranged to maintain the secondary power switching device in a continuously on state during the periods when it is operated.

18. A control apparatus according to claim 17 which is arranged to operate the primary power switching device in a  
30 manner which corrects the difference between the actual output signal, which results from operation of the secondary power switching device, and a desired output signal.

19. A control apparatus according to claim 16 which is  
35 arranged to operate the secondary power switching device in a

manner in which the output of the secondary power switching device is related to the input signal.

5 20. A control apparatus according to claim 19 which is arranged to operate the secondary power switching device in one of: a pulse width modulated (PWM), a pulse density modulated (PDM) or Sigma Delta Modulated (SDM) manner.

10 21. A control apparatus according to claim 16 which is arranged to operate the primary power switching device in one of: a pulse width modulated (PWM), a pulse density modulated (PDM) or Sigma Delta Modulated (SDM) manner.

15 22. A control apparatus according to claim 16 which is arranged to operate a plurality of primary power switching devices together as a group.

20 23. A control apparatus according to claim 16 which is arranged to operate a plurality of secondary power switching devices together as a group.

25 24. A control apparatus according to claim 16 wherein there is a further secondary power switching device and the controller is arranged to operate the further secondary power switching device when the input signal lies outside a second predetermined range, the second predetermined range being greater than the first predetermined range.

30 25. A control apparatus according to claim 16 wherein the property of the modulating input signal is amplitude.

26. A control apparatus according to claim 16 wherein the property of the modulating input signal is rate of change of amplitude.

27. A computer program product for implementing a method of controlling operation of switching devices in a modulated power supply which comprises a converter having a primary power switching device and a secondary power switching device, the  
5 converter having an output which is a combination of the outputs of the primary and secondary power switching devices, wherein the computer program product comprises instructions which are arranged to cause a control apparatus of the converter to operate only the primary power switching device  
10 while a property of a modulating input signal lies within a first predetermined range and to operate both the primary power switching device and the secondary power switching device while the property of the input signal lies outside the first predetermined range.

15 28. A method of controlling operation of switching devices in a modulated power supply which comprises a converter having a primary power switching device and a secondary power switching device, the converter having an output which is a combination  
20 of the outputs of the primary and secondary power switching devices, the method comprising:

operating only the primary power switching device while a property of a modulating input signal lies within a first predetermined range; and,

25 operating both the primary power switching device and the secondary power switching device while the property of the input signal lies outside the first predetermined range.

29. A method of generating a power supply signal using a modulated power supply which comprises a converter having a  
30 primary power switching device and a secondary power switching device, comprising:

receiving a modulating input signal;

operating only the primary power switching device while a  
35 property of the modulating input signal lies within a first predetermined range;

operating both the primary power switching device and the secondary power switching device while the property of the input signal lies outside the first predetermined range; and,

combining the outputs of the primary and secondary power switching devices to form the output power supply signal.

30. A power supply signal resulting from the method according to claim 29.

10 31. A modulated power supply comprising:

a converter having a primary power switching device and a secondary power switching device; the converter having an output which is a combination of the outputs of the primary and secondary power switching devices; and,

15 a controller responsive to a modulating input signal which generates control signals to operate the switching devices, wherein a control signal operates only the primary power switching device while a property of the input signal lies within a first predetermined range and control signals operate  
20 both the primary power switching device and the secondary power switching device while the property of the input signal lies outside the first predetermined range.